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RADIUM

EDITED BY
CHARLES H. VIOL, Ph. D.
AND
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VOL. XIV JANUARY, 1920 No. 4

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A MONTHLY JOURNAL DEVOTED TO THE CHEMISTRY PHYSICS AND THERAPEUTICS OF RADIUM AND RADIO-ACTIVE SUBSTANCES

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RADIUM

A MONTHLY JOURNAL DEVOTED TO THE CHEMISTRY, PHYSICS AND THERAPEUTICS OF RADIUM AND RADIO-ACTIVE SUBSTANCES

Edited and Published by Charles H. Viol, Ph. D., and William H. Cameron, M. D. with the assistance of collaborators working in the fields of Radiochemistry, Radioactivity and Radiumtherapy.

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VOL. XIV JANUARY, 1920 No. 4

THE TREATMENT OF EPITHELIOMA BY RADIUM*

By Russell H. Boggs, M. D.,

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Methods of treatment of epithelioma in the past have been as numerous and the end-results as variable as the types and degrees of malignancy. Epithelioma is cancer of the skin or mucous membrane requiring treatment as such, and the center should never be removed by caustics or plasters or even partially surgically. Primary epithelioma is not a surgical disease, because, in order to remove all the cancerous cells, it is nearly always necessary to remove too much healthy tissue. The permanency of the end-results in the past few years in many thousands of cases has shown that radiation far surpasses any other method.

Radium is the best form of radiation locally on the lesion and in regions where glandular metastases are likely to take place. Radium used over glandular centers or junctions, with complete roentgen treatment over the tributaries, is far superior to the most complete and often unnecessary dissection. The dissection of the glands in the neck is seldom indicated for epithelioma of the lip, or for epithelioma of the mouth or throat, if thorough radiation is given. The glands should be considered

*Reprinted from the American Journal of the Medical Sciences, clviii, 87-94, July, 1919. Read before the Westmoreland County Medical Society, May 6, 1919.

trenches and the lymphatic vessels avenues for passage of the enemy or cancer cells. Thorough radiation will sclerose the lymphatic system and lessen the danger of metastasis as well as destroy the epithelial or cancer cells which have already escaped unless the process is too far advanced. And even in the advanced cases, radiation always retards rather than hastens the malignant process as a complete dissection often does.

During the past eighteen to twenty years the writer has seen a large number of cases of epithelioma of almost every part of the body treated by almost every method, and it is surprising how many apparently innocent-looking lesions were rendered hopeless in a short time by incompetent treatment. No difference what method is used a certain number of early cases will be cured if the treatment is properly employed, but experience has proved that when radiation is given with judgment a larger percentage of cases can be cured. However, it must be remembered that radium and the roentgen rays will produce a mild reaction to a slough, that a knife will cut away any amount of tissue, that a slough of any size can be produced by cautery or chemical agents and so on with the different methods; but it is only by judgment and experience that the best results can be accomplished by any method and its limitations determined.

While radiation has been the most advanced step made in the treatment of malignancy during the past twenty-five years, it is not a specific like antitoxin for diphtheria or salvarsan for syphilis, and it is not the positive and certain cure for which we have been looking. Unfortunately, until the last two or three years, almost every surgeon operated upon every case of malignancy, regardless of the stage, without first considering any other method. Time has made a marked change, and each year there is a smaller percentage of surgeons removing epitheliomas. The great drawback in the past has been that many who have had a roentgen-ray machine or a few milligrams of radium, without having had experience, attempted to treat malignant growths. I do not mean to say that surgery is never indicated, but I believe that it is seldom if ever indicated in primary cases.

It is a well-known fact that if a lesion is completely excised a permanent cure will result, such as those on the cheek with a small amount of scar, but in a series of cases the end-results are better by radium without leaving any scar. In some locations, as the nose, eyelids, etc., the surgical operation is more difficult and the deformity is objectionable. The large and deep-seated lesions are always difficult for the surgeon to excise with all the outlying cells and should always have at least a preliminary treatment. One of the weaknesses in surgery is that in attempting to have a good cosmetic result there is the great possibility of leaving malignant cells. Cutting out the center of a malignant process primarily and leaving outlying cancer cells to be followed by radiation will not give results equal to those obtained by at least treating the case primarily with radium or the roentgen ray.

Caustics may be divided into three classes, namely, chemical agents, actual cautery or electric coagulation. These have a place only as an adjunct to radiation. Their chief use is to remove broken-down necrotic tissue which has first been treated and sterilized by radium or the roentgen rays, and are only necessary in far-advanced cases . Before they are ever employed the lymphatics should be at least partially blocked by some form of active radiation.

The therapeutic action of radium on new growth is manifested pri-

marily on the nuclei of the cells and inhibits the power of proliferation before the function of the cell is impaired. There is also a change produced in the small bloodvessels. The endothelial cells of the intima degenerate, the lumen of the vessels retracts, finally becoming obliterated, and consequently the tumor cells cannot obtain the nourishment needed for their maintenance of life and for their proliferation.

Embryonic cells and those undergoing active proliferation are the most susceptible to radiation. It has been shown that malignant growths are retarded by radiation and become less malignant, although they may not have diminished in size or disappeared. By further increasing the quantity of radiation the injury becomes more pronounced and the cells are completely destroyed, the rays acting differently on the various types of cells, destroying one kind of tissue and leaving the other adjacent tissue intact or so slightly injured that it will completely recover. Cancer cells are from three to seven times less resistant than normal tissue, depending upon the type of the lesion. Squamous-cell epithelioma requires from two to four times more radiation to eradicate the disease than the basal form. A few years ago this fact led many to believe that the squamous or the more malignant form could not be cured by radium. The reason for this was insufficient treatment.

The term epithelioma in the past has been unsatisfactory, having been applied to all epithelial growths, semimalignant or malignant, regardless of the degree or situation, which fact has accounted for such a diversified opinion in regard to many innocent-looking lesions, which in time show a malignant and destructive type. Epithelioma has certain pathological characteristics; it is a purposeless proliferation of cells extending beyond normal limits and invading adjacent tissues, especially the lymphatics, with slight inflammatory changes.

When the student leaves college he has been taught there are three varieties of epithelioma, namely, superficial, deep and papillary; but it means very little to him, and he has only a vague idea of epithelioma and its treatment. As a rule epithelioma, in the early stages, does not seem to cause much alarm among the inhabitants of a community, nor even among many physicians, and for this reason many patients with lesions of the innocent-looking type come late after they have been treated by superficial caustics, and are in a hopeless condition. The disease comes on slowly, so slowly that often no one takes notice of it until it is far advanced. After the age of forty all lesions which are constantly inflamed and scaly or show any degenerative changes should receive prompt attention. Prophylactic treatment of all excrescences, such as warts or degenerated moles, the removal or correction of any irritation of the skin or mucous membrane, the proper treatment of cracked lip, persistent spots of eczema or leukoplakia, would often save the patient a long and expensive treatment and oftentimes the life of the patient. Precancerous changes should always receive prompt attention by the physician. From the therapeutic standpoint we must determine whether we are treating basal-cell epithelioma or a squamous-cell type. Rodent ulcer or basal cell is characterized by its steady and progressive spread and is usually observed on the upper part of the face about the nose and eyes. It is extremely destructive, eating deeply into the tissue; in fact, destroying everything in its way without any tendency toward metastases or glandular involvement.

We have four classes of epithelioma in respect to method of treatment: (1) the lesion which can be cured by one application of radium with the proper dosage; (2) the lesion which is so situated that glan-

dular involvement is likely to take place or has already occurred and in which the roentgen rays should be employed as an adjunct to treat the adjacent glands; (3) those cases in which the local application of radium supplemented by the roentgen rays will only act as a palliative measure; (4) those cases in which radiotherapy should be followed by excision or fulguration.

On account of the nature of the cases, as well as the lymphatic supply, epithelioma of different locations will be described separately. The virulence of an epithelioma, increases or decreases proportionately with the richness or poverty of lymphatic supply. Before giving a prognosis of epithelioma, besides the location, several factors must be taken into consideration, namely, variety, extent, duration and rapidity of process. In many superficial forms the disease if neglected is slow in its progress, but eventually it will become dangerous to life if left untreated. In all instances the treatment should be given early, because it then requires less radiation and there is less chance of return. In the early stages, when the disease is limited to the face and of the superficial type, the treatment is almost invariably successful and permanently so. In this location, even when moderately advanced, the results are favorable in a large percentage of cases, but it requires so much more treatment. Good results are obtained in the deep-seated and papillomatous forms in the early stages, but in these cases glandular involvement occurs early.

The prognosis is not so favorable in epithelioma in which marked destruction has already taken place and in which there is considerable infiltration of the surrounding tissues, particularly so if the glands are invaded.

The basal form of rodent ulcer is amenable to treatment, but when left untreated or treated improperly is always of a serious nature, because this type of epithelioma seldom invades glands but destroys everything in its way.

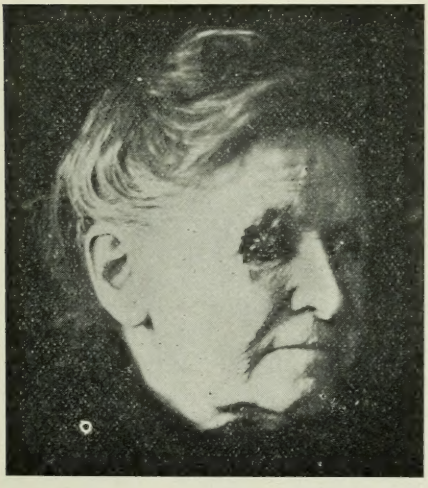
Epithelioma of the upper part of the face, when the lesion is small, will usually respond to one application of radium. In epithelioma of the eyelids radium can be brought in contact with the lesion and there is little or no danger to the eye, and before the cartilage is invaded a small amount of radium will effect a cure. Recurrent lesions which have been treated by caustics are very resistant because the cartilage is usually involved and the infiltrated scar does not respond so promptly. The cosmetic results in the primary cases which have not been treated by caustics are frequently surprisingly good even when the lesion is rather extensive. The resultant scar is smooth, pliable and not thick and elevated like that following caustics or even a cutting operation.

Results in the treatment of epithelioma of the lower lip by radium, supplemented by the roentgen rays, are proved equal or superior to those obtained by surgery. This is a perfectly legitimate method of treatment, but must be carried out thoroughly. It is liable to abuse, however, the same as surgery has been in the past. Epithelioma of the lower lip is always a serious condition, and when radiation is given it must be employed in such a manner as to destroy all the cancer cells in the local lesions and in the adjacent lymphatic glands. With efficient treatment over 90 per cent. of the early cases are permanently cured without producing any deformity, more advanced cases are cured and hopeless cases receive retardation and palliation which cannot be accomplished by any other method.

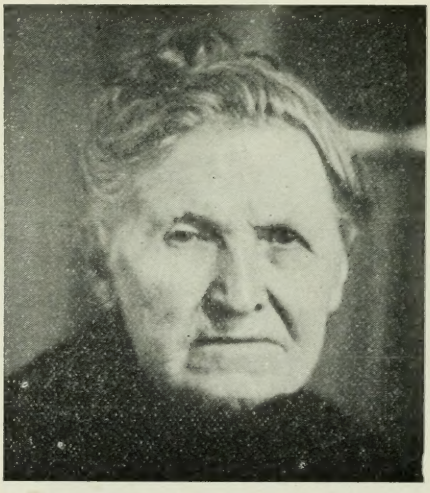
In my opinion surgery, in most instances, should be reserved for

Epithelioma—above right eye.

Result by radium.

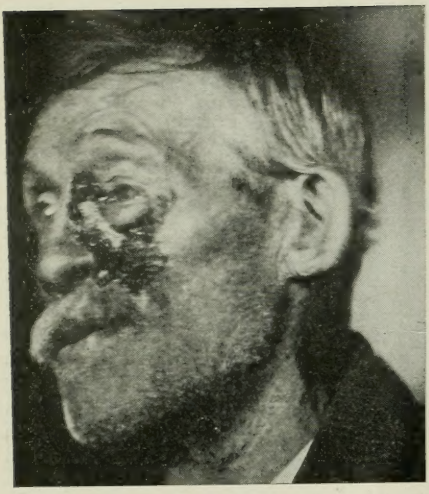


Epithelioma of upper eyelid with deep ulceration.

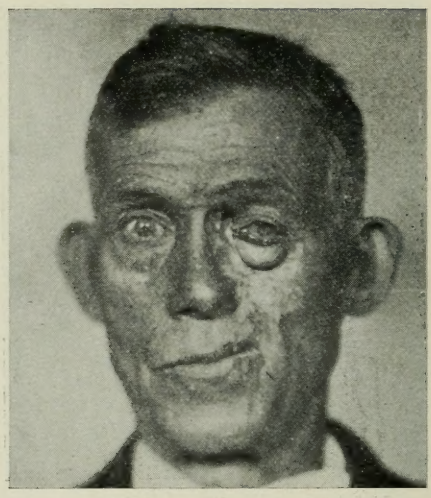


Result by radium after 4½ years after treatment.

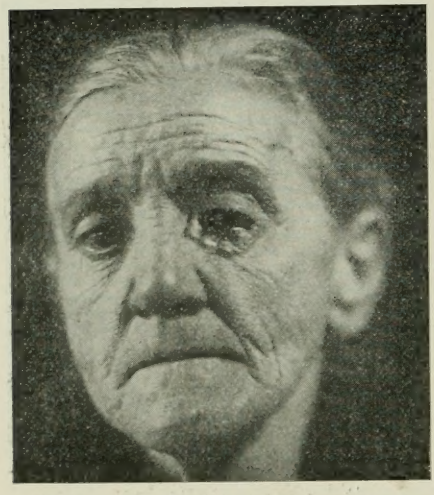
advanced cases and then only in cases after the cancer cells in the local lesion and glands draining the lip have either been entirely destroyed or in cases in which only a few cancer cells remain which are not very malignant in character. In advanced cases usually it is better not to push radiation up to a point where the superficial tissue will undergo a marked degeneration or a necrosis. It is much better to use a combination of methods and have the lesion removed surgically or by fulguration after it has been radiated and then follow up the treatment again. Radium has the advantage of not leaving a contracted scar which so frequently follows the removal of a v-shaped portion of the lip and in which recurrence frequently takes place. Even with the best surgery a large amount of contraction takes place and later the movement of the mouth often irritates the scar and is undoubtedly the cause of the recurrence. We know that irritation is the cause of cancer in the healthy tissues, and



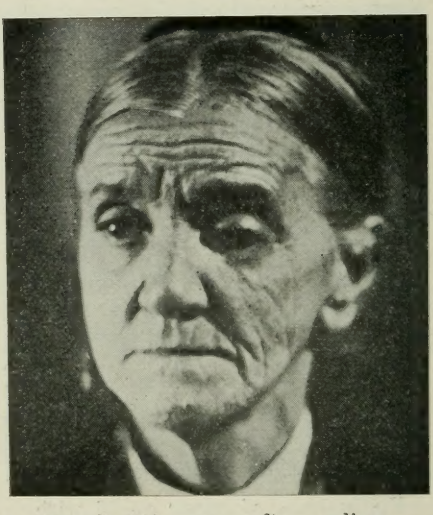
Epithelioma of cheek.



Result three months after treatment.



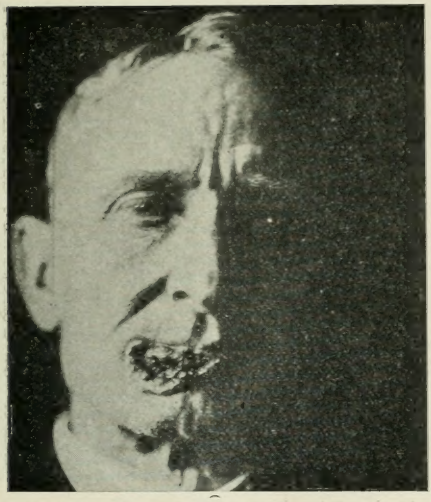
Epithelioma—with destruction of lower eyelid.



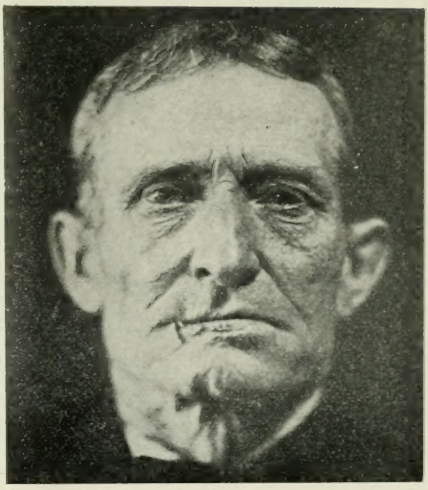
Result 3½ years after radium treatment.

once the lip has been invaded by cancer cells this is more likely to occur.

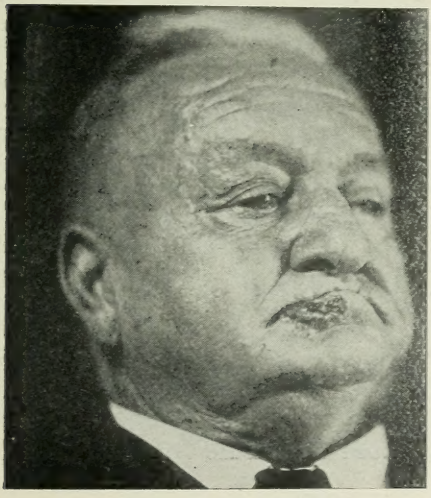
Before treating epithelioma of the lower lip a careful study should be made of the lymphatic glands and the manner in which they metastasize. The lymphatics draining the lower lip are the submental, which receive the lymphatic vessels from the chin and the central portion of the lower lip and the submaxillary which receive the lymphatics of the lateral portion. The submaxillary salivary gland is closely connected and often metastasizes. There is an anastomosis between the lymphatics which drain both sides of the lower lip as well as those draining the central portion. This must be remembered when radiating the lymphatics of the neck. The deep cervical chain extends from the mastoid process to the clavicle; some of the glands lie behind the internal jugular and subclavian veins and cannot be reached surgically without the removal of the jugular. The cervical glands metastasize from the



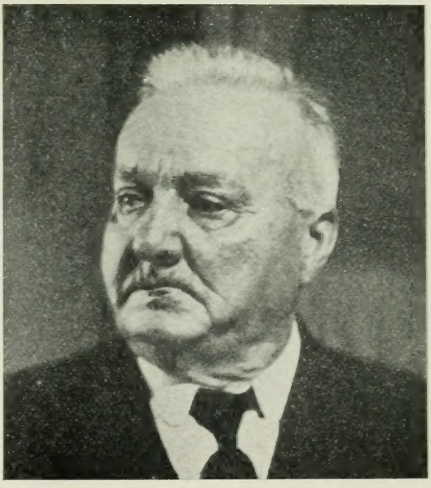
Epithelioma of the lower lip unsuccessfully treated by x-ray, carbon dioxide and various kinds of pastes.



Same patient after radium treatment, notice small amount of scar.



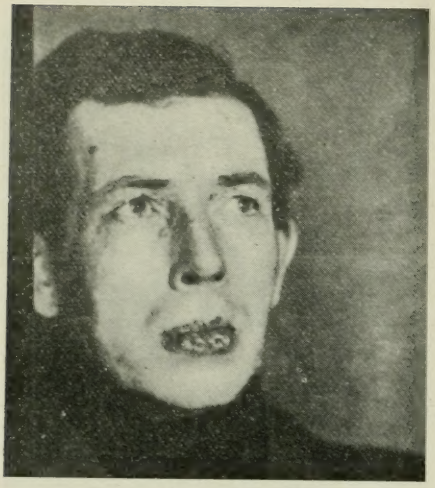
Epithelioma of lower lip.



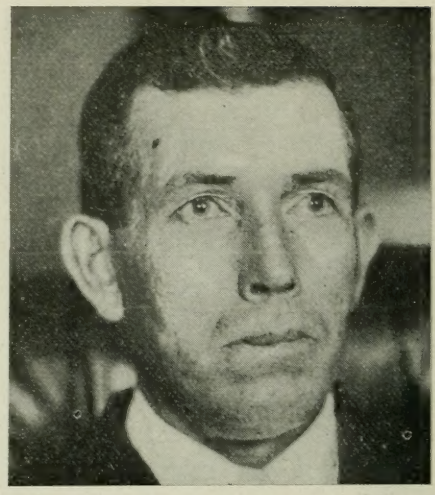
After Treatment.

submental and submaxillary. When the submental and submaxillary are palpable some cancer cells usually have reached the deep cervical chain. Early invasion of the lymphatic chains must be realized, and treatment by radiation must be given as carefully as a radical operation is performed. The writer has seen many cases of epithelioma of the lower lip in which only the lesion on the lip received treatment and in which at the same time the lymphatic glands were involved.

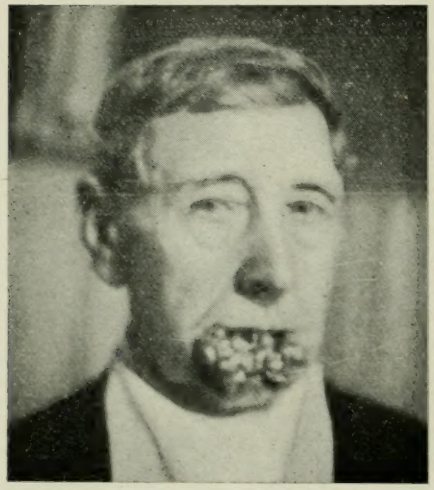
The objection to surgical removal is the frequent recurrence in the scar, because the operation on the glands cannot be sufficiently complete, no matter how thoroughly the dissection is carried out. The removal of the submental part of the parotid, submaxillary and all the glands which metastasize, together with the ligation and excision of the jugular is no easy task; besides, often leaving cancer cells in deeper glands which cannot be reached.



Epithelioma of lower lip with glandular involvement.



Lip healed. Deep recurrence one year later, lip remained well.



Result of caustic treatment of epithelioma of lip. Radium given for palliation. Offensive discharge disappeared and growth reduced greatly in size by one treatment.

Result by Plasters.

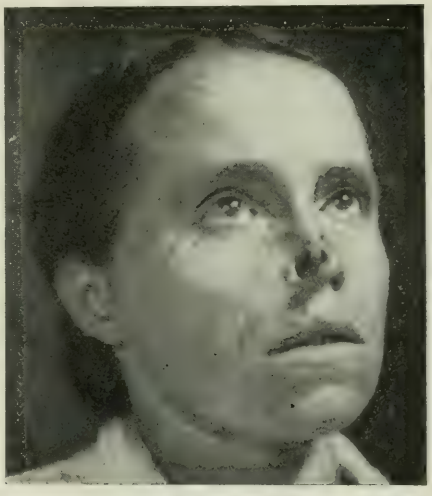
Today the radiotherapeutist has seen early cases in which a diagnosis is yet questionable; he has seen cases a trifle more advanced after radical operation in which he administered prophylactic radiation as well as in many hopelessly inoperable cases. He not only sees more cases in a year than any individual surgeon of equal standing and reputation, but he works earnestly over many cases after they have been abandoned by the family physician, dermatologist and surgeon. He is in the best possible position to compare different methods of treatment from the standpoint of ultimate results. In short, he has a broader clinical knowledge of the subject than any other physician.

When ulceration has taken place, early surgical removal, wide and radical, is followed by recurrences in more than 50 per cent. of the cases

Rhinoschleroma.

Result after treatment.

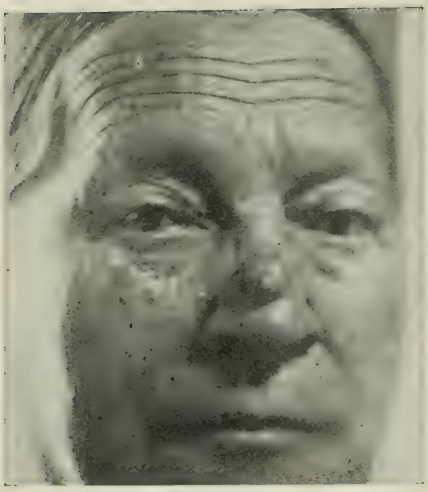
Epithelioma—referred after destruction of nose by disease.



Result after one radium treatment.

in which there are no palpable glands at the time of operation and in more than 75 per cent. in which there is any glandular involvement. All precancerous lesions should be removed by some method without leaving any scar whatever.

Results in the treatment of malignant growths of the mouth and throat have not been successful by the older methods. When removed surgically even the smaller lesions are prone to recur; cautery in selected cases may give slightly better results and the end-results obtained by those using radium alone, such as the radium institutions, are not much better except in the early cases. The pessimistic tone of the reports from the London radium and other institutes must be discounted when it is recalled that most of these institutions treat only inoperable cases, and with radium alone. Radium, except in the early cases, should be combined, with other suitable measures, in order to obtain the best end-results.



Epithelioma of nose.

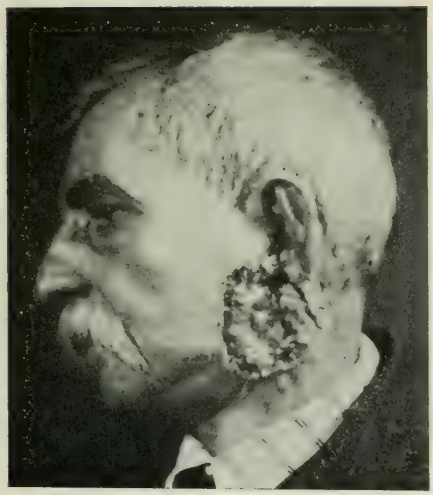
Result 3½ years after radium treatment.

Untreated carcinoma of breast—in a hopeless condition.

Slough following improper radiation.

In all examinations of the mouth and throat, precancerous lesions, such as leukoplakia, should always be looked for and treated promptly. Many of the earlier epitheliomas, before they have invaded the deeper tissues, will respond to one application of radium. It is to be remembered that the persistent lesions in the mouth and throat are nearly always malignant or luetic. Superficial cautery seldom removes a malignant lesion and nearly always hastens metastases.

I am sorry to say that so many cases are referred after superficial cautery has been employed in which the growth has not only been aggravated but deep metastases have taken place. Many physicians, not realizing the malignancy of these lesions, will often try cauterization or some inert mouth-wash, allowing the disease to become far advanced before they refer their patients to a laryngologist or for radium treatment. There is no place where it is more important to have early and



Result of repeated cautery.

Advanced epithelioma result by inefficient x-ray treatment allowing the condition to become hopeless.

Advanced carcinoma of neck; never had any treatment.

Recurrence after surgical removal of epithelioma of eyelid with later enucleation of eyeball.

proper treatment than in the mouth and throat. The selection of the method depends not only on the location and extent of the lesion but also on the experience of the operator or the radiotherapeutist. Roentgenization of the lymphatic glands should always supplement radium therapy as described for cancer of the lip.

No difference what method is employed a preliminary application of radium in advanced cases is always of great service, as we have no other agent which destroys cancer cells to the same extent without injury to healthy tissue. Preradiation, in fact, makes cancer cells latent by stopping cell-proliferation early in the treatment and prevents spreading of the disease when other procedures are employed.

Electric coagulation or fulguration is a method which I have em-

Paget's disease.

Result 4 years after treatment.

ployed, after a preliminary treatment of radium to the growth in advanced cases and roentgenization of adjacent lymphatic glands, with some excellent end-results, even in advanced cases. The advantages of electric coagulation are the destruction of tissues without opening the blood- and lymph-vessels and the prevention of dissemination which might occur with a cutting operation. The large amount of carcinomatous tissue which can be destroyed by electric coagulation without hemorrhage is an item of great importance, which compels serious consideration by those who have treated many malignant cases. I have a few cases of advanced or inoperable carcinoma, including the floor of the mouth, buccal mucous membrane and tonsils, which were clinically cured by giving preliminary radiation followed by electric coagulation, and will be reported later.

Recurrences in the cicatrix and the glands frequently follow even when the tumor has been completely excised in its early stage. So frequently is this the case that we are bound to conclude that in many cases it is regional and not entirely local from the beginning, even before the neoplasm is scarcely recognizable by the naked eye, because the whole of the lymphatic circulation as well as the glands is already infected.

Delay in treatment of epithelioma of the mouth is not wholly responsible for the unsatisfactory results by surgery or even by any method in a certain percentage of cases. However, in these cases, in equal stages, the character of the end-results by radium surpasses the results by any other method. When patients have a very unhealthy mouth the gums are retracted from the teeth and there is more or less pyorrhea, the teeth are loose, and the whole mouth gives the appearance that the patient is suffering from lead-poisoning. The same results must not be expected as when the mucous membrane surrounding an epithelioma is healthy and the tissue has the usual normal resistance. Such cases often do badly by any method and the process is only retarded for a time by radiation. Also, as good results must not be expected in a luetic mouth as in a healthy patient.

Epithelioma of the back of the hand usually responds to treatment, but the prognosis is not so favorable as with the ordinary face cases, because the axillary glands are often early invaded. Therefore small

lesions should have prompt and thorough treatment. No one realizes this better than the roentgenologists who have had keratosis on their hands. Some authorities state that progress in epithelioma in this situation is slow and there is less liability of grave ulceration than epithelioma in other situations. This has not been my experience entirely. They have been usually slow in progress, but the lymphatic glands were invaded in many cases that I have seen at the time they were referred. Therefore, even the axillary glands should receive treatment.

Epithelioma of the genitals is always a serious matter, although with the proper treatment in the beginning the results are often successful. Left untreated until far advanced, palliation is all that can be expected from any form of treatment.

Paget's disease or eczematous epithelioma of the nipple is classified by most dermatologists under epitheliomatosis or carcinoma of the skin. It is like superficial epithelioma, the onset is slow and the condition suggests an eczematous involvement of the areola of the nipple. The process begins with a moderate inflammation exhibited as redness and scaling involving the nipple areola. Murphy called attention very forcibly in the *Year's Progress of Medicine and Surgery*, 1915, that Paget's disease is cancer from the very first, and that even in the early cases there was a mortality of over 90 per cent. of cases even when submitted to surgical operation. I have treated cases of Paget's disease by radiation alone and have patients clinically cured for over ten years. This corresponds with the experience of many others. The treatment should consist in radiation not only applied locally, but the adjacent glands should be treated as thoroughly as it is given postoperatively for carcinoma of the breast. If these cases are treated early, when there is only the eczematous condition present, and treated thoroughly, the results are rather uniform. It is to be remembered in all cases there is no attempt at repair, and, when abandoned to its course, the ultimate result is a profound ulceration with the destructive effects most noticeable in the region of primary invasion, the entire breast becomes cancerous and invades the lymphatics. It is to be remembered that local treatment suggested for eczema has no effect on this condition.

THE USE OF RADIUM IN THE TREATMENT OF METRORRHAGIA AND MENORRHAGIA.

BY

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AND

WM. C. GEWIN, M.D.,

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1. In the discussion of these two conditions, it may not be out of place to mention some of the physiological effects of radium on cell life. All physiological or pathological effects of radio-active substance must be carried back to their action on protoplasm, whether it be the cells of plants or in the destruction of a neoplasm in the body, that is involved. A short exposure to radium accelerates the vital forces to a more energetic action of repair, while a more intense exposure in-

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hibits them, which retardation may be cumulative and persistent through many generations of cell proliferation, hence the long time required to cure a radium burn.

2. There are various theories as to the specific effects of radio-active substances on cell life, and whether the radiation effects the enzymes of the cell is questionable. Suffice to say, that when we thoroughly understand the effects of radiation on biological cells, then we will be able to accurately apply radio-active therapeutics in the treatment of disease.

3. The treatment of uterine hemorrhage, with or without fibromyoma is so well established, that one must assume that a given dose will produce amenorrhoea. In women over thirty-five and under thirty, a temporary menopause can be brought about by a careful dosage, while in women over thirty the results will be less certain, and the number of cases of fibromyoma will shrink to insignificant proportions under proper dosage with radium.

4. Take for granted, then, that the above results are assurable, several problems are to be solved. The first of these, the proper selection of the cases for radiotherapy, and dosage concerns the general methods of applications and dosage of the radiation to obtain the results above mentioned. The conditions which are more often referred for this form of treatment are, first, those of excessive prolonged hemorrhage from the uterus with no gross pathological lesion, which occur at puberty, at the menopause, and to a less extent during the child-bearing period, and secondly, fibromyoma of the uterus in all its phases of development. The cause of the bleeding in the grossly normal uterus up to ten years ago was thought to lie in the anatomical lesions, which indicate various stages of inflammation either in the endometrium or in the muscles. Chronic endomotritis was applied to all conditions of the endometrium, in most cases of uterine hemorrhage. This idea as to the cause of uterine bleeding has been discredited by the more recent investigators where records have already been shown that the swollen congested edematous membrane is the counterpart or exaggeration of the intermenstral endometrium, and that it is concerned, no doubt, in the actual bleeding from the uterus, which, nevertheless, shows evidence of being stimulated by the same influence such as substances, which bring on menstruation. The latest researches show that such substances do exist in the corpus luteum, and in the placenta, and that in individuals suffering from uterine hemorrhage there is found a ripe corpus luteum, and in normal menstruation the cycle of hypoplasia and depletion through which the endometrium passes, is coincident with the cycle of development, and recession of the corpus luteum, and that the bleeding is dependent upon the corpus luteum is now absolutely believed. It is almost certain that the pathological, as well as the normal uterine bleeding, is due to some disturbance of the Graafian follicle in some stage of its development, whether this is effected by other granular substances, etc., or not. The pathological hemorrhage is a variation in amount, duration, character, periodicity from the normal menstrual flow.

5. If the abnormal uterine bleeding is nothing but a variation of the normal, and we wish to produce its cessation, the logical procedure is to destroy the essential element in the menstrual cycle, *i. e.*, Graafian follicle. Next to the lymphocyte and the spermatozoa, the ripe Graafian

follicle is most susceptible to the action of radium. It needs but a step to apply these agents to the Graafian follicle to bring about the condition of the normal or pathological uterine flow. The ripe follicle is much more susceptible than is the primordial follicle, and if the dose of radium be regulated to destroy only the follicles of an advanced degree of development, then a definite period of amenorrhea can be brought about, depending on the number of primordial or immature follicles remaining after the exposure to radium.

6. Uterine hemorrhage is often accompanied by gross anatomical lesions in the uterus, and a complete analysis concerning such cases shows that in four conditions does there appear to be any association between the bleeding and the pathological conditions and changes. The conditions which cause hemorrhage from the uterus are (a) a small percentage of cases of hemorrhage due to pelvic inflammation, (b) a large percentage due to retro-version, although the displacement may be complicated with cystic ovary, infantile uterus, etc., (c) the third group includes the ulcer-active conditions, such as carcinoma, polypus, pedunculated submucous fibroids, (d) the fourth cause of uterine hemorrhage is fibromyoma of the uterus. There is no doubt as to the definite coincidence of these conditions, however, the causal relationship is still obscure, that menorrhagia may be coincident with fibroid without any causal relationship and that the bleeding may recur after the fibroid has disappeared, without a recurrence of the fibroid can be easily substantiated by many cases.

7. An interesting question which arises from a study of these cases is what relation they may have to the uterine hemorrhage when the bleeding reappears in the absence of the tumor, but one can not refrain from feeling that there is a coincidence in the presence of a fibroid and a functional menorrhagia. A close study of these cases will show that there are some causal relationships between many fibroids and the uterine bleeding, and one is almost forced to conclude that all fibroids exercise a contributary, if not an essential role in many cases of bleeding from the uterus, because in no case of fibromyoma treated by radiotheraphy, that has been reported, has there been any more trouble experienced than has been encountered in the treatment of the grossly normal uterus. The excessive hemorrhage in this class of cases is due to a disturbance in the proper relationship between the elements which control menstruation, and hence the ideal treatment is to restore that relationship. In the hemorrhage in young women, the disturbance is one of development, and every effort should be made to restore this balance by general treatment, which is to replace deficient factors by curettage, if necessary, even though improvements follow only in about 10 per cent of the cases so treated. It has been found that the treatment by radium is far better in all these cases. In women over thirty partial amenorrhea can be promised with somewhat greater difficulty, but in most instances, certainly. In this class the promise of a permanent menopause, rather than to any radiotherapeusis that may have been used.

8. Six hundred and twenty-five milligram hours intra-uterine, with 0.5 millimeter filter is safe in a woman under thirty-five. Over that the dosage is better cut down by a millimeter of brass. In women around thirty-eight or over, radiotherapy becomes the method of choice, because the menstrual balance is disturbed by the approach of old age

and the cessation of the child bearing period, probably due to the decadence of the ovarian function. Since the natural menopause is imminent, it would seem to be logical to precipitate it and try to save the woman months or even years of partial or complete incapacity from uterine hemorrhage. In such cases massive dosages are indicated from the starting of the radiotherapeusis.

9. The treatment of bleeding associated with retroversion is very much like the above. The most prominent symptom, the displacement, should be corrected in all cases, if possible, without operation, and the effect upon the bleeding noted. In younger women an operation should be performed if reduction of the displaced uterus fails. In older women having the symptoms from the retroversion, it seems fairer to leave the displacement alone, because the reduction in older women has not, in our experience, relieved the bleeding. In these women radiotheraphy should be resorted to at the beginning of the hemorrhage.

10. The excessive hemorrhage associated with fibromyoma of the uterus can not be treated alone, but must be considered along with the whole question of the proper treatment of fibromyoma. Before the use of radium there were certain principles governing the treatment of fibrosis. The first of these was that the fibroid itself was a menace and caused no damage except by its size, and that would not change from a benign tumor to a sarcoma. Secondly, that such a fibroid should not be treated unless it gave symptoms, because sarcoma is so rare that operating on mere superstition would harm more individuals than it would help. The symptoms for which operation was advised were, in the first place excessive hemorrhage, secondly, variations due to pressure on nerves or organs, and thirdly, rapid growth or large size of benign tumor mass.

11. With radium as a curative agent the problem as to the best method of treatment remains the same, i. e., the new problem of the proper class of cases needing treatment of the fibromyoma which are suitable for radio-active treatment, and of those cases which should be operated on. As above stated, the results to be expected from radiation are, first, the cessation of bleeding; second, the shrinking of the fibromyoma. This shrinkage requires varying lengths of time in different cases, and should receive scant consideration from the radiotherapeutist. If a mass is pressing on any important organ, or if the tumor is extremely large, and if the patient's health permits operative risk, the mechanical removal of the tumor seems to be better treatment under our present status of information, however, any excessive hemorrhage in these cases should receive treatment by radium in all cases in which a menopause is acceptable, but in younger women this method of treatment is not indicated unless the general condition of the patient would not permit of surgical interference. Because in the younger class if radium is used it should be applied in massive doses, in which we expect only a complete cessation of the ability to bear children. A menopause is almost sure to result if any good is obtained from this treatment. Then if we temporize with small doses of radiotherapy, the chances are that a sarcomatous condition would result, and more energetic application of the radium would have to be used if results are to be expected.

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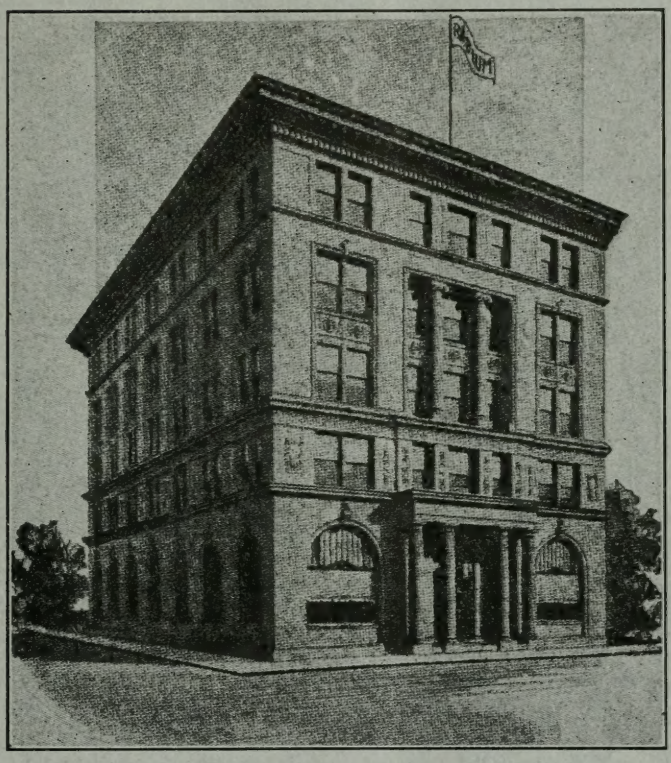

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